

Bi-monthly Progress Report

For the Period Beginning July 1, 1972 and Ending August 31, 1972

E72-10081
CR-128096

A. Title of Investigation:

An Interdisciplinary Analysis of ERTS Data for Colorado
Mountain Environments Using ADP Techniques

ERTS-A Proposal Number: SR030/040

B. GSFC Identification Number: UN103

Principal Investigator: R. M. Hoffer

C. The lack of small scale photographic data has caused our most
severe problems during this phase of the experiment. Aerial
photography is required to locate and map homogeneous areas of
cover types for use during ERTS data analysis. Poor weather
conditions and a heavy mission schedule for NASA aircraft have
prevented collection of this photography.

It was hoped that photography would be collected during a
June flight and available prior to the onset of the fall snow
season. Sufficient time would then have been available to
locate, draw preliminary maps and field check selected areas.
However, due to the delay in obtaining the photography, much of
the field work will have to be postponed until the spring of
1973.

D. (1) During this period, personnel from INSTAAR have been
actively engaged in the acquisition and mapping of ground data.
Emphasis has been placed on mapping in the following areas:

- (a) Geomorphic mapping of landform features; completed
on 16 7 1/2 minute USGS topographic maps.
- (b) Ground location of many vegetation sites to use as
candidate training sample areas. Confirmation of the
suitability of these sites will be made after the
aerial photography is made available.
- (c) Minimum snowline mapping in selected alpine sites in
the study areas.
- (d) Intensive mapping at several scales of vegetation and
land complexes within two catchement basins in the
San Juan Study Area.

(E72-10081) AN INTERDISCIPLINARY ANALYSIS
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ENVIRONMENTS USING ADP TECHNIQUES
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(Purdue Univ.) 31 Aug. 1972 4 p CACL 08E G3/13 00081
Unclas

N72-32340

Two of the LARS personnel were also involved in some preliminary collection of ground data in the San Juan Test Site. Several sites amenable to the topographic modeling portion of the proposal were located. Additionally, ground cover information over several areas was annotated on USGS topographic maps, and information sources within the U. S. Forest Service were contacted.

Although ERTS data was not available over either Test Area, LARS performed analysis on digital data tapes of the Texoma frame which were received on July 25th. The analysis of this data has concentrated on two primary objectives: 1) determination of the best techniques to utilize in approaching analysis of ERTS imagery from the Colorado test sites, and 2) determination of the types of earth surface features that can be spectrally differentiated using ERTS imagery. A copy of the summary of results of the preliminary classification which was sent to NASA on August 15, 1972 for this sub-frame area is enclosed as Appendix A.

- D. (2) During the next bi-monthly period INSTAAR personnel will continue their program of mapping cover types for selected areas within the test site. They will also pursue the contacting of personnel in key agencies with whom we will determine the potential economic impacts of this type of data and data analysis procedures.

Work at LARS during this next reporting period will involve additional analysis of the Ouachita Mountain area in the Texoma frame concentrating on development of techniques to use in the analysis of ERTS imagery. Particular attention will be paid to the definition of spectral characteristics of different forest areas and to the determination of the relationship of spectral characteristics and topography in some of the mountain areas. A more detailed analysis of water resources of this frame will also be pursued.

Analysis efforts will be switched from the Texoma frame as soon as ERTS data from the Colorado sites becomes available.

- E. Preliminary results from the Ouachita portion of the Texoma frame of data indicate many potentials in the analysis and interpretation of ERTS data. We believe that one of the more significant aspects of this analysis sequence has been the investigation of a technique to relate ERTS analysis and surface observation analysis. At present a sequence involving 1) preliminary analysis based solely upon the spectral characteristics

of the data, followed by 2) a surface observation mission to obtain visual information and oblique color photography of particular points of interest in the test site area, appears to provide an extremely efficient technique for obtaining particularly meaningful surface observation data. Following such a procedure allows one to concentrate on particular points of interest in the entire ERTS frame and thereby make the surface observation data obtained to be particularly significant and meaningful.

The analysis of the Texoma frame has also been significant from the standpoint of demonstrating a fast turn around analysis capability. Additionally, the analysis has shown the potential accuracy and degree of complexity of features that can be identified and mapped using ERTS data.

- F. No articles or reports were published during the bi-monthly period, other than the preliminary analysis report of the Ouachita portion of the Texoma frame which was submitted and a copy of which is attached as Appendix A.
- G. Since we have had some difficulty in making contact with our NASA monitors, we would recommend establishment of a procedure to make telephone contact with either our technical or scientific monitor on a bi-weekly basis.
- H. There are no changes in the Standing Order Form contemplated or requested.
- I. Since no data have been received, no ERTS Image Descriptor Forms are submitted.
- J. No Data Request Forms have been submitted during the period.

APPENDIX A

2.A Land Use Analysis

Ouachita Mountain Subframe
Analysis of Classification Results
Classification Serial Number 0810206901, Run Number 72001406
Maximum Resolution

This area has extremely diverse cover types and contains a number of significant geologic features, reservoirs, rivers, agricultural land, range land, and a large amount of forest cover. A preliminary analysis based on the spectral characteristics of the data was produced. Visual observations and oblique photography from light aircraft were then obtained along with information from local resource personnel. A second analysis was performed utilizing all of this new information.

Evidence of human activity may be seen in several areas. A clearing operation has taken place which forest cover has been removed, windrowed and converted to native grass rangeland. A nearby area is in the same process and has been aerially sprayed to kill mixed hardwood forest cover in the first step in conversion to rangeland. The location of a recently completed powerline was shown in the imagery and verified with ground observations.

Another interesting feature in the final classification was a distinct banding effect observed in the earth imagery and which is apparently related to the geologic structure of the area. Surface observations and aerial photos of these areas indicate that the differences are caused by a combination of topographic slope and aspect, vegetative density differences which were influenced by the underlying geologic structure, and observable moisture stress conditions in the forest cover in some of the geologic banded structures. In some portions of the area limestone outcroppings also caused a distinct spectral response thereby adding to the observed banding effect.

Differences in water quality were given as the cause for the spectral difference observed in the reservoirs in this area. These water quality differences were not particularly obvious to the eye from the light aircraft but showed up as distinct differences in channels 1 and 2 while all water bodies had very low response in channels 3 and 4 (infrared) of the MSS data.

